1. "The probable maximum production of mesothorium will not exceed the equivalent of 6 grams of radium per annum." I am perfectly willing to admit this, but 6 gram equivalents of mesothorium will go a long way toward relieving the present use of radium for luminous paint. This would exceed the average radium production of the Standard Chemical Company for the six years previous to 1918.

2. "The economical use of mesothorium in luminous compounds is only possible a year or two after refining." On the bottom of page 1,181 of my article on radium, referred to above, I stated: "After ripening for about a year after being prepared, it can be used for luminous paint just as efficiently as radium."

3. "For medical purposes, the short life and varying gamma ray activity of mesothorium make this product less desirable than radium." On page 1,182 of my article I state: "Mesothorium can also be used for cancer treatment, although its short life makes it much less desirable for this purpose than radium."

4. Dr. Viol prints a table to show the change of gamma ray activity of mesothorium with time. From this table, at the end of the second year, 78 per cent. of the activity has accumulated; and at the end of the ninth year, on the decay side of the curve, there is still 78 per cent. of the activity left. This would give seven years of useful life in luminous paint. In my paper, on page 1,182 I state: "Its usefulness for such purpose will last for four or five years, which is as long as is required for cheap watches, push buttons, etc."

In the same paper I make the following statement:

> But as the physicians and surgeons of the country are not purchasing enough radium to make the industry a financial success, it is natural that the manufacturers should take other means of creating a demand.

The main object of my remarks to which Dr. Viol has taken exception was to try and stir up the medical men of this country as to the future supply of radium. No one can blame manufacturers for getting other uses for their product if the main use is not taken advantage of. If the surgeons and hospitals will not purchase radium, it will naturally go to luminous paint and be used for any other purpose that will create a demand. I believe that Dr. Viol would much rather sell for medical purposes than for miscellaneous uses in which the radium is lost; and the writer would most certainly prefer to see such a condition come about.

During the war, a considerable amount of the radium abroad in England, France and Germany, which previously had been used for cancer treatment, was drawn on for war purposes. Even in this country, a number of physicians sold their supply. This condition makes still more important the presentation of the facts as they are to the medical fraternity.

R. B. Moore

U. S. Bureau of Mines,
Golden, Colo.

QUOTATIONS

THE FUTURE OF MEDICINE

Yesterday the British Medical Association concluded the most successful meeting in its annals. About the "atmosphere" of this unprecedented gathering there can be no mistake. It was one of serene and reasoned confidence in the future. The wisest leaders, who are also the most assured prophets, of the profession well know that it will not be given to them to enter the promised land which they see from afar. But they have stood upon the mountain tops and they have gazed upon it. That is enough. They will draw nearer to it; others who follow will cross its borders and continue the advance. None can set bounds to it, for it is infinite as the progress of human learning. This sense of its vastness, of its mystery, of its endless possibilities was the keynote of the meeting. The doctors realize that the war has opened to them a new world, and that it will be their high privilege to be able to apply to their fellow-men for all time the great store of new learning they have harvested on the battlefields of three continents. We can not pretend to review in this place the great number

of instructive papers and discussions which have filled these busy days. Some idea of them will have been gathered from the reports and the articles by our medical correspondent which we have published. But the general trend and spirit of the proceedings are sufficiently illustrated by the president's opening address. Like Sir Douglas Haig, Sir Clifford Allbutt had no new principles to announce. What he did was to restate with striking force and clearness some old principles, which occasionally appear to sink out of sight, and to show how they irradiate and inform whole masses of new facts. He does not hesitate to speak of the present as "the greatest moment in the history of medicine," or of the revelation to us that medicine has "come to a new birth." But when all is said and done, when all the magnificent examples of discovery and of interrelation have been described and arrayed, the widest and the most fundamental conclusion reached goes back from generation to generation to Coleridge, to Dante, and the schoolmen, to the greatest of the Greek thinkers. Coleridge insisted upon the interrelation of all knowledge, and invented the term "esemplastic" to describe it. "All things," wrote the great Florentine, "have order between them," and he declares that in this order lies the "form" which makes the universe like to God and in which angels see the impress of His power. The thought runs through the Divine Comedy, and guides him through the "gran mar doll' essere," as it does his master, Thomas Aquinas. How does it differ from the doctrine laid down by Sir Clifford Allbutt, when he tells us that "as the individual is but a link in the chain, so the human chain is a strand in the web of all living things." Our work, he says, must be upon the Aristotelian "double track" of the one into the many, and of the many into the one.

The principle is old, but the facts which have to be brought under it are overwhelming in their number and in their novelty. The war has added to them enormously, and has suggested complex systems of interrelation unsuspected before, besides affording incontrovertible proofs of truths seen but dimly until now. It is this seemingly endless progress upon lines known and established which makes medicine so fascinating to the scientific imagination. What can be more wonderful than some of the facts mentioned in this address; what more stimulating than some of the unsolved problems on which it touches? Sir Clifford dwells upon the light which modern physics throws upon medicine. He instances the electric methods of taking quantitative measurements of mechanical pressures in the circulation of the fluids of the body and in the heart, and he comes to the conclusion that apparently all biological reactions are determined by molecular structure. Above physics comes biology, but "we can not even guess at the links of the chains where physics recedes and biochemistry takes the lead." Merely to glance at the questions presented to us, he declares, is to discern "how vast is the realm of knowledge yet unconquered—nay, undiscovered." The tiny cell itself is a microcosm full of intense activities, which are beginning to emerge into the light through the labors of the mathematical physicist, of the spectroscopist, of the radiologist, and of the physical chemist. How are these new and vast worlds to be explored, and the knowledge of them adapted to the welfare of man? That is the practical problem. The yarn of biochemistry and biology, Sir Clifford says in a fine image, must be continually carried and woven into the web of the practising doctor's art. It is impossible for any man in practise, whatever his abilities and his industry, to perform the work for himself. He can not by his unassisted efforts keep pace with the great tide of fresh learning that is sweeping in upon him. There must be some intermediary between the working doctor and the men devoted to laboratory research—some middlemen, some *liaison* officers to keep them in touch—and the investigator, be it remembered, needs this touch as much as does the practitioner; the bedside and the laboratory must work hand in hand, if either is to derive the fullest fruit from the interrogation of nature. Sir Clifford is clear that in every good clinical school there ought to be a body of whole-time professors with

fully-equipped laboratories and staffs, who should be "continually irrigating the profession from the springs of the pure sciences." In that way, or in another, the problem must be solved, if English medicine is to keep its unsurpassed position in the world.—The London *Times*.

SCIENTIFIC BOOKS

A Sketch of the Natural History of the District of Columbia, together with an Indexed Edition of the U. S. Geological Survey's 1917 Map of Washington and Vicinity. By W. L. McAtee. Bulletin of the Biological Society of Washington, No. 1, May, 1918, pp. 142, 5 maps.

Reliable information regarding the biology of restricted areas is, for many reasons, of much value far beyond its mere local significance. The capital city of our country has been fortunate during the past century in the many famous naturalists that have either resided or studied here. The present comprehensive though succinct account of biological aspects of the region about the city of Washington is therefore most acceptable. Its purpose is to present a brief biological history of the District of Columbia, to point out the best places for field study, and to furnish geographical assistance in locating them. Thus the bulletin falls naturally into three parts: (1) A historical sketch of the various branches of natural history in their relation to the District of Columbia; (2) an account of the distribution of life in the District of Columbia region; and (3) an index to the United States Geological Survey's 1917 map of Washington and vicinity.

The history of the biology of the District of Columbia, it is interesting to note, dates back, we are told in a brief introduction, to the year 1608, and the redoubtable Captain John Smith of Pocahontas fame was the first observer. A number of early authors on general subjects have references to the animals and plants of the region.

The first information regarding the botany is by Petiver in 1698, who published some notes on animals and plants sent him from Maryland. The first actual list of plants of the District of Columbia appeared in 1816, as a part of David Baillie Warden's "Chorographical and Statistical Description of the District of Columbia," and contained 142 species. A résumé of the progress of botanical study in the District of Columbia since that time down to the present shows a final list of 1,598 species, many of which have been described as new from local material. A short botanical bibliography includes the most important local publications.

The first insects from the District of Columbia were recorded in 1816 by Warden, but little was known of this group until 1859, when Baron Osten Sacken began the publication of his important articles on the insect fauna of the District. Many workers since his time have, like him, found the District of Columbia excellent collecting ground for insects, and the total list of species for the region is now very large, including 3,000 beetles alone. Many hundred species, chiefly diptera and hymenoptera, have been described from material collected near Washington. A partial bibliography, arranged according to orders and covering 16 pages, shows graphically the activity of local entomologists. Of other invertebrates there have been recorded from the District 90 species of mollusks, 308 species of spiders, 10 species of phalangids and 246 rotifers.

Fishes have here received more attention than any other group of vertebrates excepting birds, and the list of species now totals 94, several of which were described from specimens taken in the vicinity of Washington. The distribution of fishes in this region is made interesting by the fact that tidewater ends here, so that in addition to the freshwater fauna at least 26 species of salt-water fishes occur more or less regularly.

Of batrachians, 27 species are said to occur; and of reptiles, 36. The only poisonous snake at present extant is the copperhead, though the rattlesnake formerly lived in this region. As with the other groups, the account of reptiles and batrachians is followed by a short bibliography.